Reference List

NWA 1195

Depleted Shergottite

315 grams

***Figure 1**: Photograph of NWA 1195 by Adam and Greg Hupé.*

Introduction

Irving *et al.* (2002) report that a 50 gram stone with a distinctive thin weathering rind was found in March 2002 near Safsaf, Morocco. Careful searching led to the discovery of a second, larger piece of this same rock (265 grams). NWA1195 is 347 m.y. old with an exposure to cosmic rays for 1.1 m.y. (see below).

Figure 1 shows how the two pieces fit together.

Petrography

Euhedral olivine megacrysts (up to 4 mm) are set in a groundmass of low-Ca pyroxene and maskelynite, with minor chromite, pyrrhotite and merrillite. This sample appears to have mineral compositions similar to that of the Dar al Gani shergottites.

Symes et al. (2008) report that NWA1195 is "an olivine-orthopyroxene-phyric shergottite" and give a description – but no mode.

Mineral Chemistry

Olivine: Olivine exhibits strong compositional zoning from Fo_{81} cores to Fo_{60} rims.

Pyroxenes: The pyroxenes are zoned from Wo_4En_{77} to $Wo_{12}En_{67}$

Maskelynite: Maskelynite is chemically zoned from An_{63} to An_{59}.

Whole-rock Composition

Kuehner et al. (2011) determined the trace element composition of NWA1195, indicating that it has a "depleted" REE pattern (figure 4). Brandon et al. (2012) reported on some very unusual elements. Major elements are not reported.

Radiogenic Isotopes

Symes et al. (2005, 2008) have determined a crystallization age of 347 ± 13 m.y. by Sm-Nd internal mineral isochron technique (figures 2 and 3). They also attempted a Rb-Sr isochron; with no success, probably because of terrestrial weathering.

Table 1. Chemical composition of NWA 1195.

reference	Kuehler11		Symes08		Brandon12
weight					
SiO2 %					
TiO2					
Al2O3					
FeO					15
MnO					
MgO					18.1
CaO					
Na2O					
K2O					
P2O5					
S %					
sum					
Sc ppm					
V					
Cr					
Co					
Ni					
Cu					
Zn					
Ga					
Ge ppb					
As					
Se					
Rb			0.374	(b)	
Sr			19.2	(b)	
Y					
Zr					
Nb					
Mo					
Ru ppb					6.12
Rh					
Pd ppb					4.13
Ag ppb					
Cd ppb					
In ppb					
Sn ppb					
Sb ppb					
Te ppb					
Cs ppm					
Ba					
La	0.26	(a)			
Ce	0.67	(a)			
Pr	0.111	(a)			
Nd	0.72	(a)	0.295	(b)	
Sm	0.56	(a)	0.254	(b)	
Eu	0.32	(a)			
Gd	1.25	(a)			
Tb	0.26	(a)			
Dy	1.83	(a)			
Ho	0.4	(a)			
Er	1.13	(a)			
Tm	0.16	(a)			
Yb	1.03	(a)			
Lu	0.15	(a)			
Hf					
Ta					
W ppb					
Re ppb					0.237
Os ppb					4.05
Ir ppb					3.3
Pt ppb					6.84
Au ppb					
Th ppm					
U ppm					
technique	*(a) ICP-MS, (b) IDMS*				

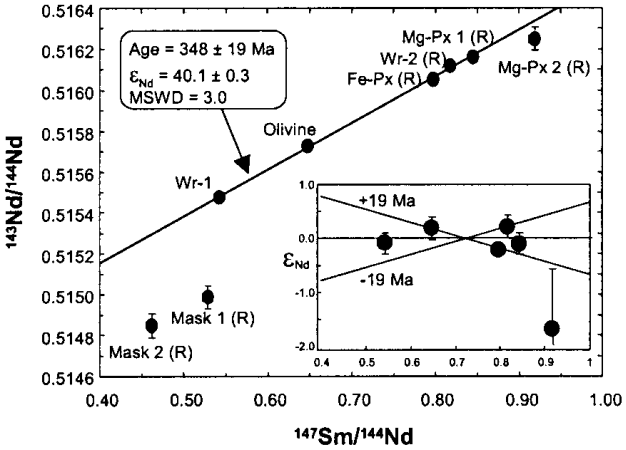

Figure 2: Sm-Nd mineral isochron for NWA 1195 (from Symes et al. 2005).

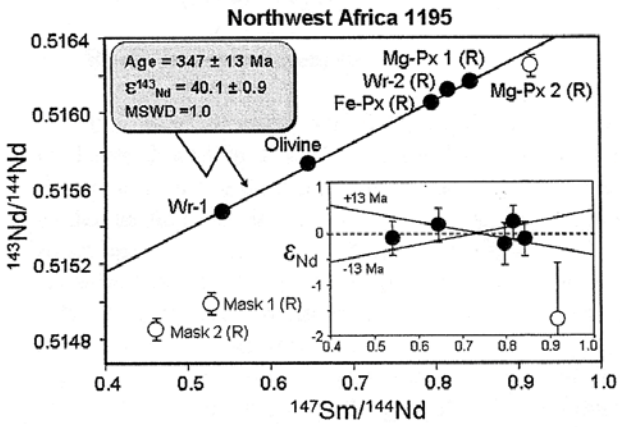

Figure 3: Sm-Nd isochron from Symes et al. 2008.

Cosmogenic Isotopes

The ^{10}Be exposure age of NWA1195 is 1.1 ± 0.2 m.y. and the terrestrial age is > 37 thousand years (Nishiizumi et al. 2004).

Alteration:

NWA1195 has a distinct weathering rind (figure 1). Some pyroxenes have patchy overgrowths of (?)chlorite-like minerals. Calcite occurs sparsely along grain boundaries.

Other Isotopes

Brandon et al. (2012) reported Os isotopes on residue and leached samples of NWA1195.

References for NWA1195

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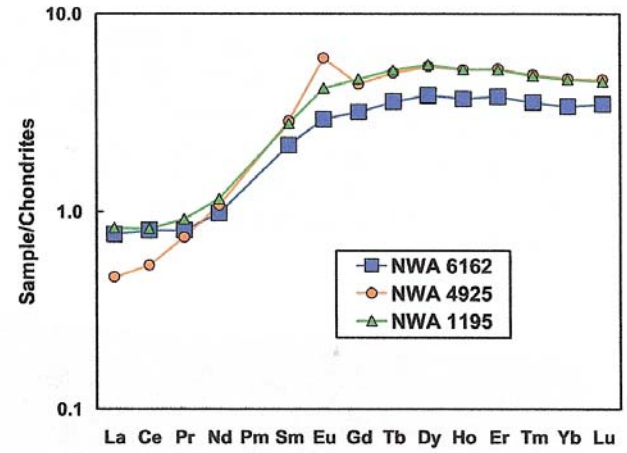

Figure 4: Normalized rare-earth-element pattern for NWA1195 compared with other "depleted" samples (Kuehner et al. 2011).

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